

1
FIG.

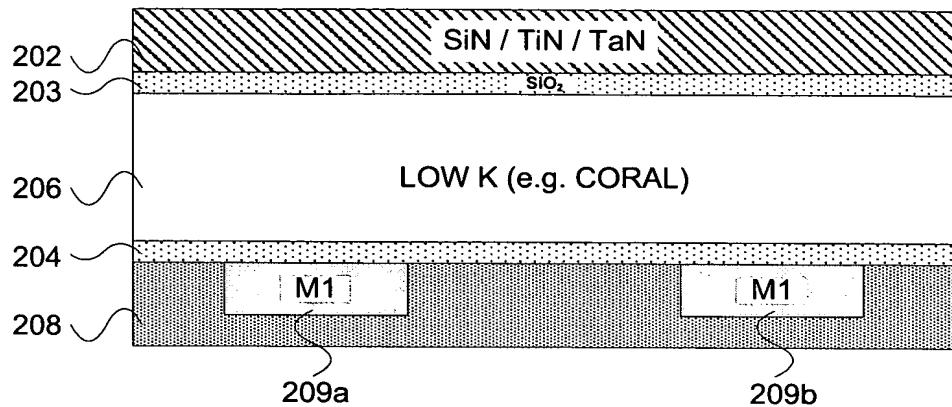


FIG. 2A

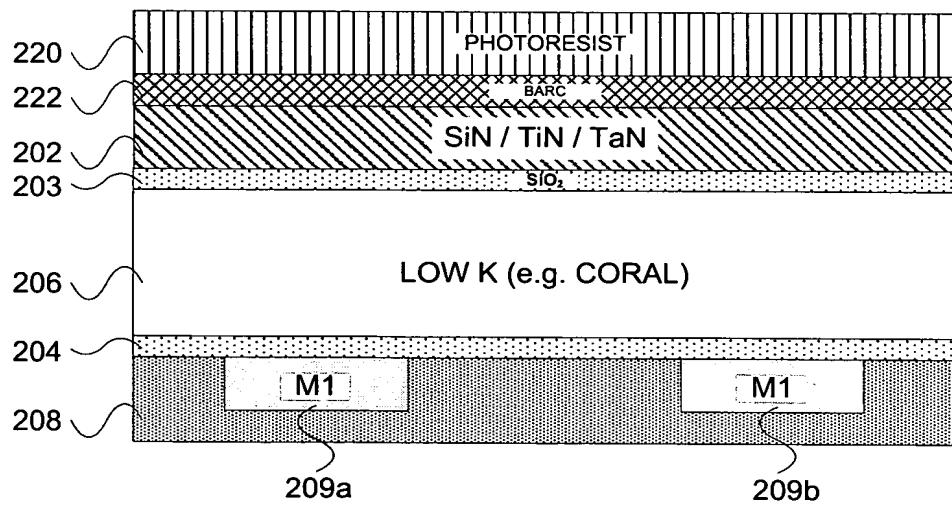


FIG. 2B

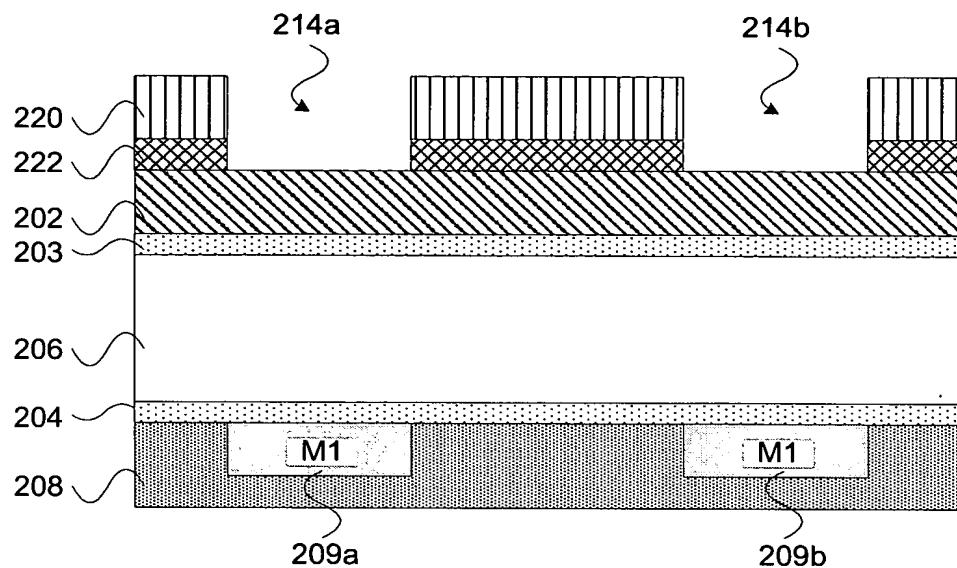


FIG. 2C

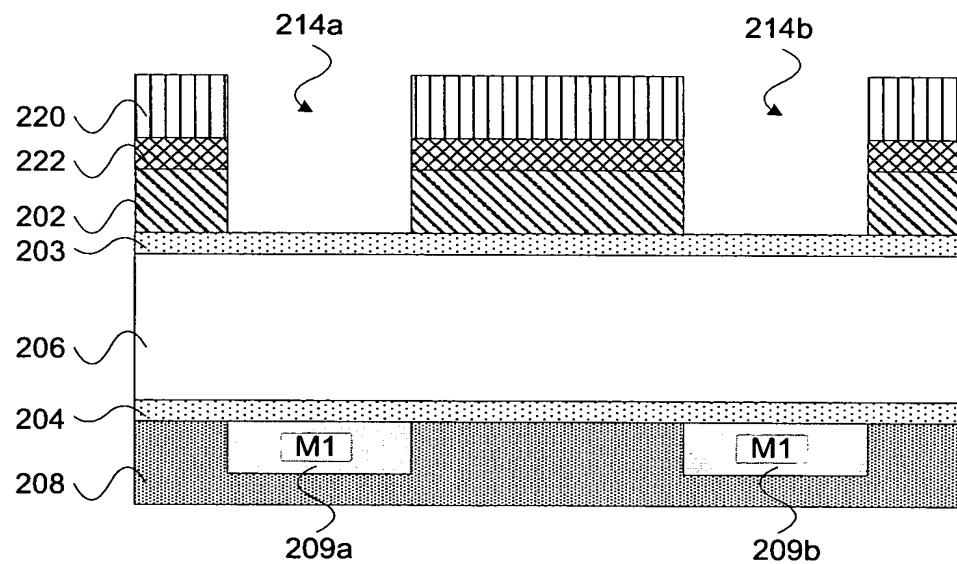


FIG. 2D

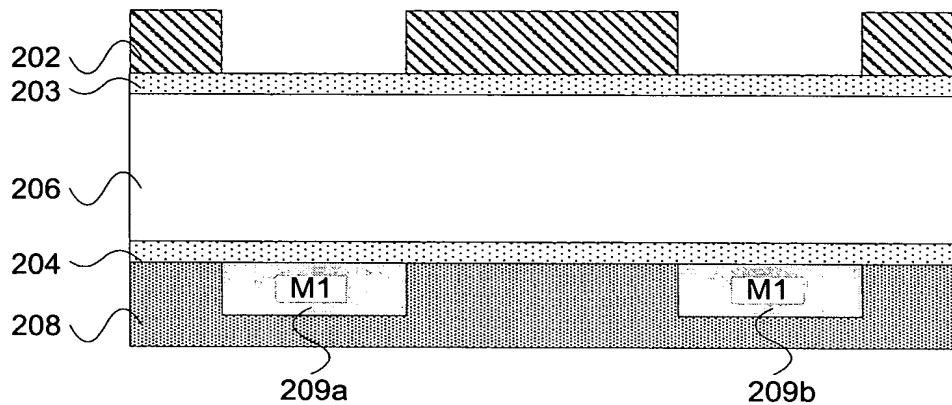


FIG. 2E

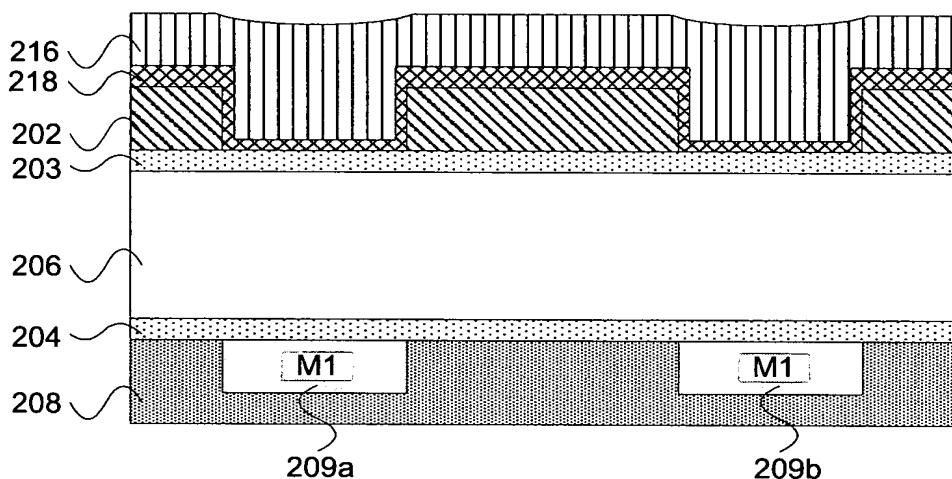


FIG. 2F

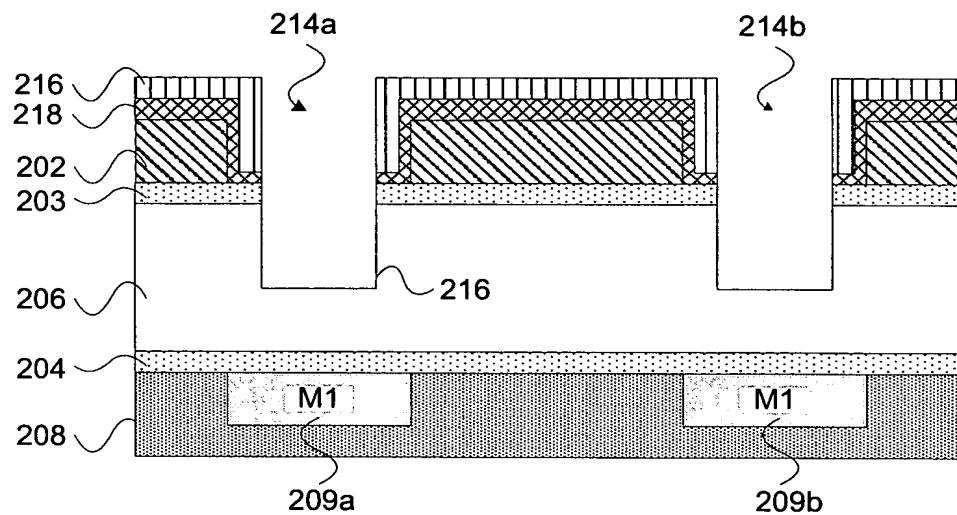


FIG. 2G

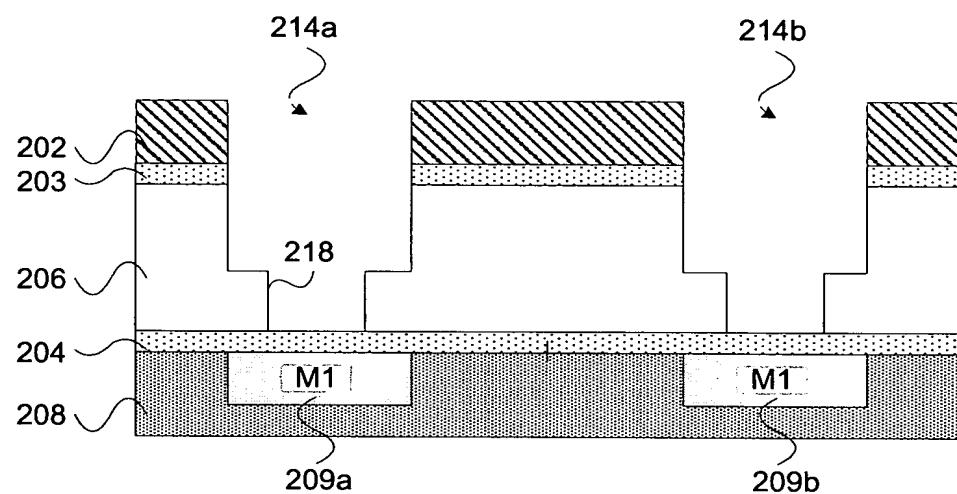


FIG. 2H

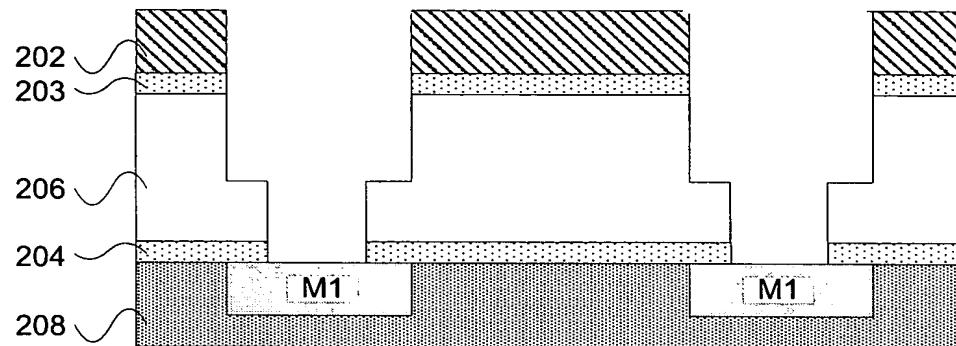
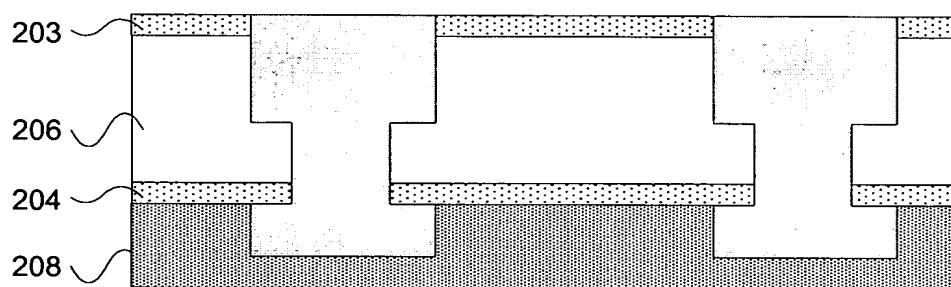


FIG. 2I



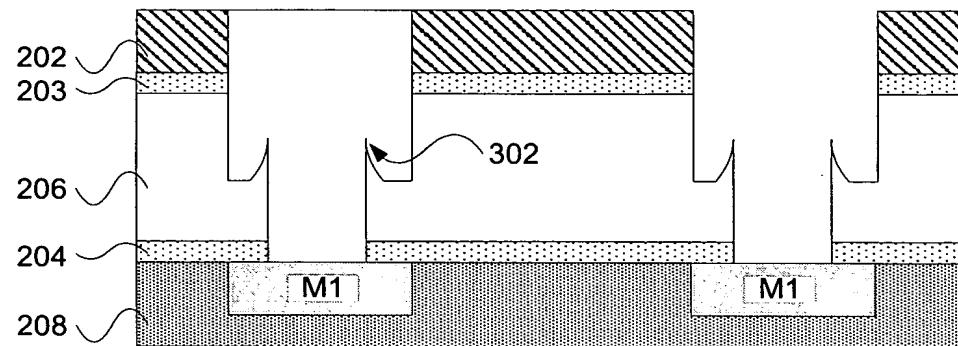


FIG. 3A

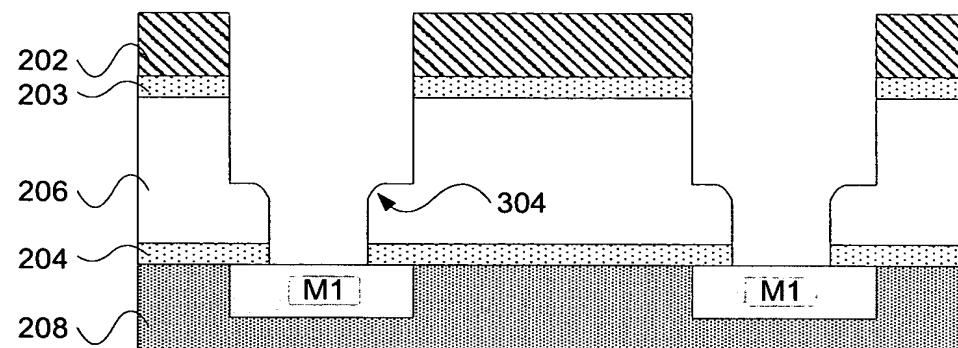


FIG. 3B

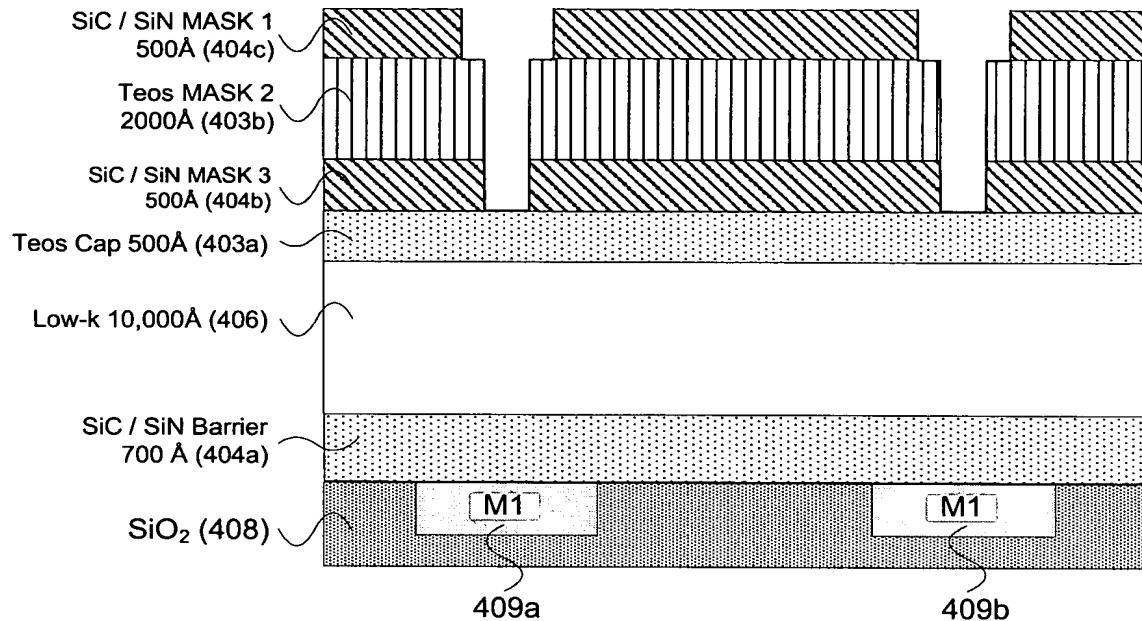


FIG. 4A

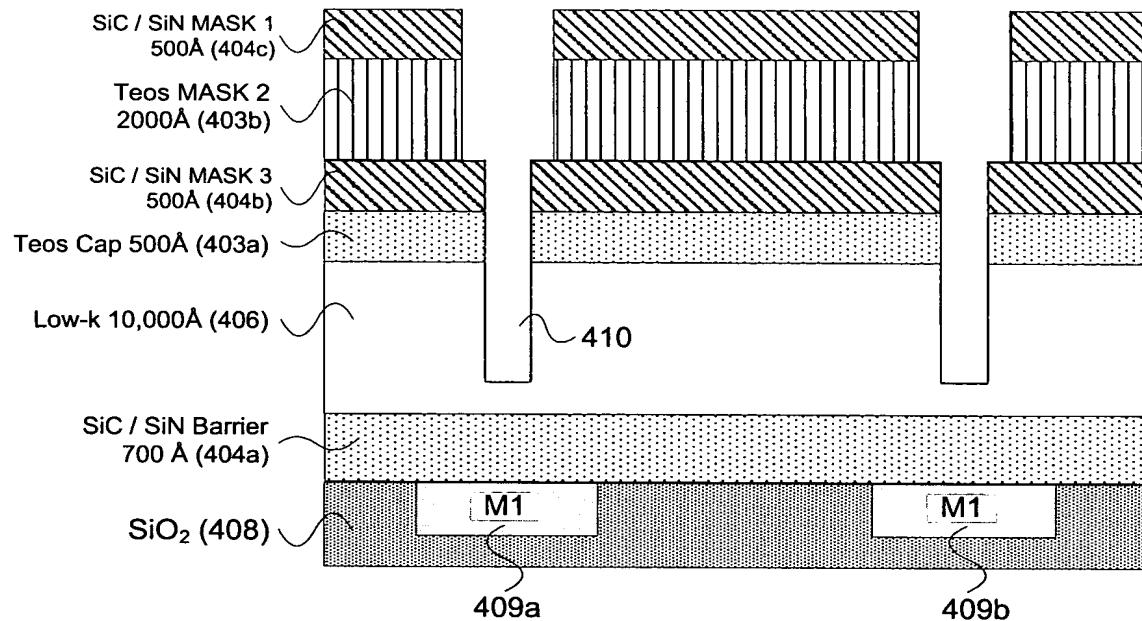


FIG. 4B

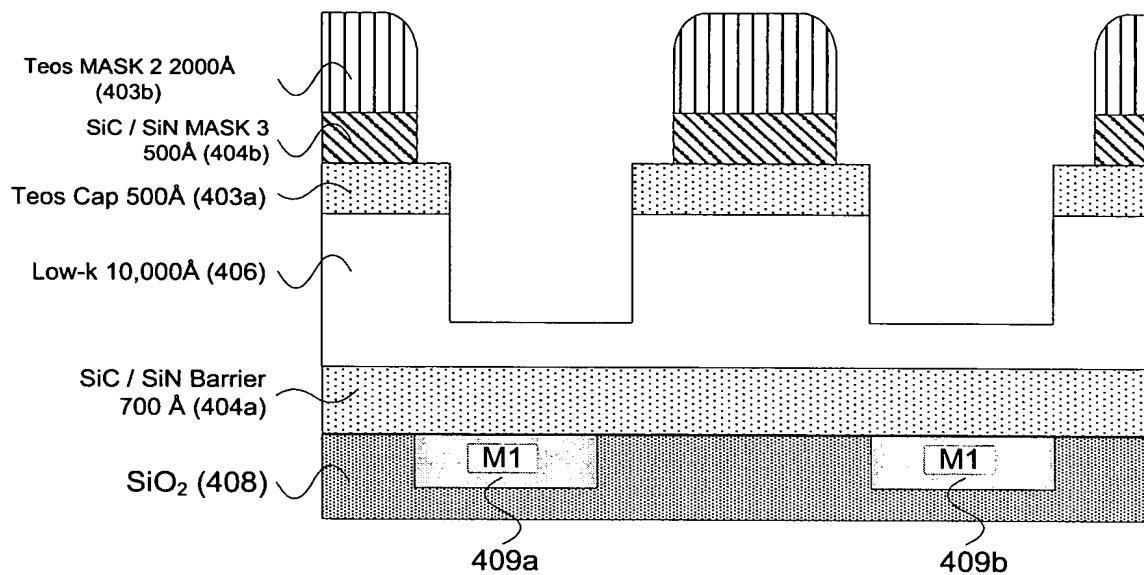


FIG. 4C

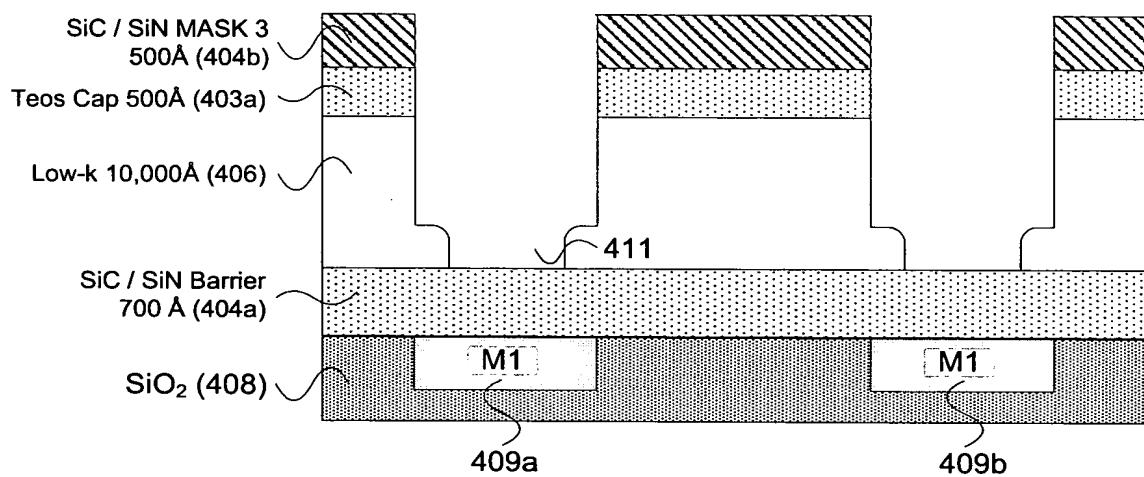


FIG. 4D

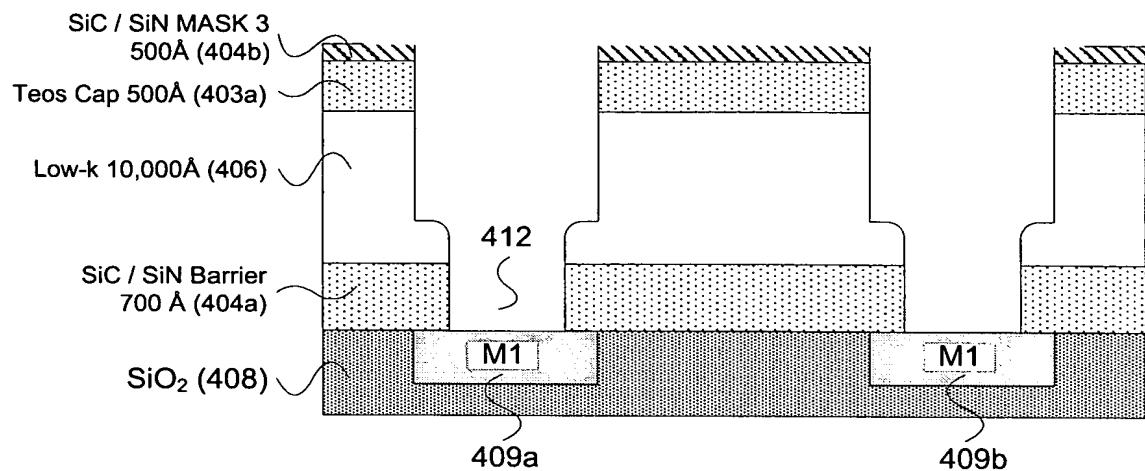


FIG. 4E

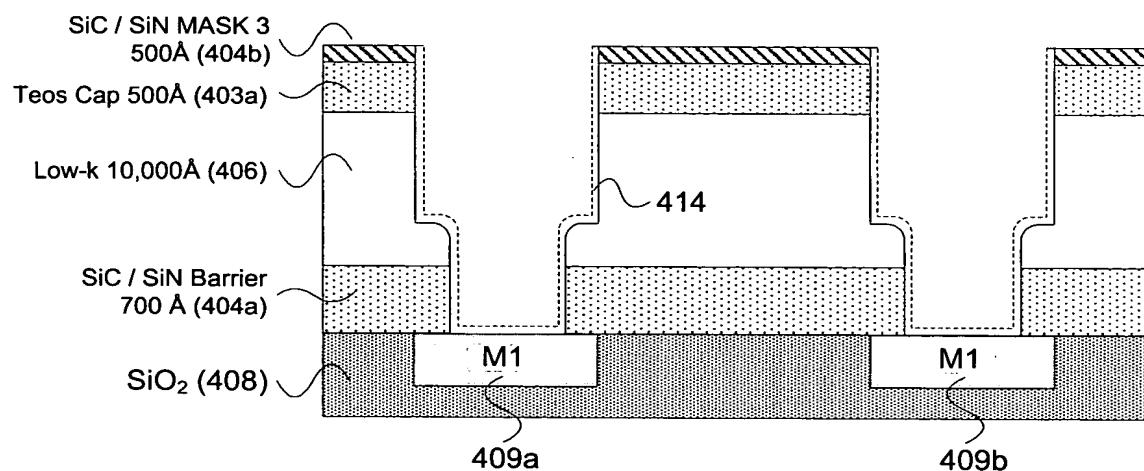


FIG. 4F

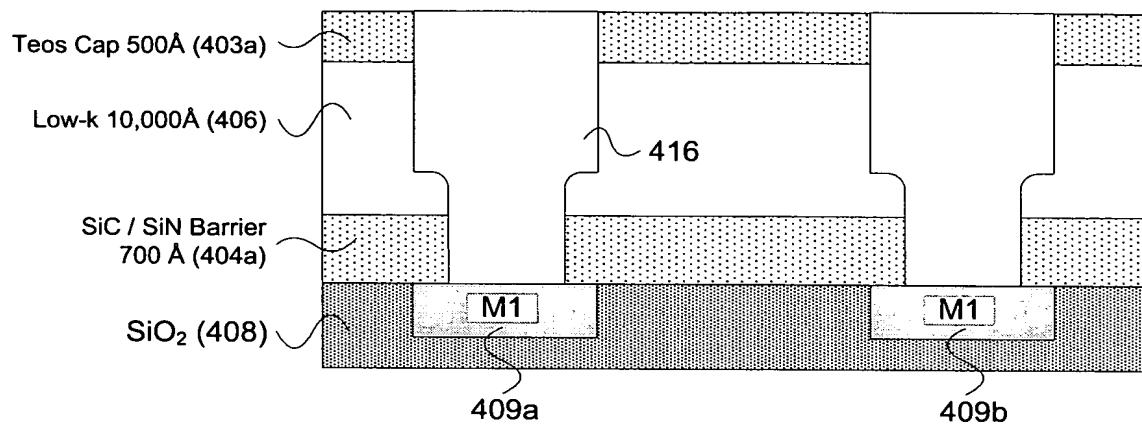


FIG. 4G

502

INTRODUCING IN A PLASMA PROCESSING SYSTEM, A SUBSTRATE HAVING A SEMI-CONDUCTOR LAYER, A FIRST BARRIER LAYER DISPOSED ABOVE THE SEMI-CONDUCTOR LAYER, A LOW-K LAYER DISPOSED ABOVE THE FIRST BARRIER LAYER, A THIRD HARD MASK LAYER DISPOSED ABOVE THE LOW-K LAYER; A SECOND HARD MASK LAYER DISPOSED ABOVE THE THIRD HARD MASK LAYER, AND A FIRST HARD MASK LAYER DISPOSED ABOVE THE SECOND HARD MASK LAYER.

504

ALTERNATIVELY ETCHING THE SUBSTRATE WITH A FIRST ETCCHANT AND A SECOND ETCCHANT, WHEREIN THE FIRST ETCCHANT HAS A LOW SELECTIVITY TO A FIRST HARD MASK MATERIAL OF THE FIRST HARD MASK LAYER, A THIRD HARD MASK MATERIAL OF THE A THIRD HARD MASK LAYER, AND A FIRST BARRIER LAYER MATERIAL OF THE FIRST BARRIER LAYER, BUT A HIGH SELECTIVITY TO A SECOND HARD MASK MATERIAL OF THE SECOND HARD MASK LAYER, AND WHEREIN THE SECOND ETCCHANT HAS A HIGH SELECTIVITY TO THE FIRST HARD MASK MATERIAL OF THE FIRST HARD MASK LAYER, THE THIRD HARD MASK MATERIAL OF THE THIRD HARD MASK LAYER, AND THE FIRST BARRIER LAYER MATERIAL OF THE FIRST BARRIER LAYER, AND THE FIRST ETCCHANT HAS A LOW SELECTIVITY TO THE SECOND HARD MASK MATERIAL OF THE SECOND HARD MASK LAYER.

FIG. 5A

506

INTRODUCING IN A PLASMA PROCESSING SYSTEM, A SUBSTRATE HAVING A SEMI-CONDUCTOR LAYER, A FIRST BARRIER LAYER DISPOSED ABOVE THE SEMI-CONDUCTOR LAYER, A LOW-K LAYER DISPOSED ABOVE THE FIRST BARRIER LAYER, A SECOND BARRIER LAYER DISPOSED ABOVE THE LOW-K LAYER, A THIRD HARD MASK LAYER DISPOSED ABOVE THE SECOND BARRIER LAYER, A SECOND HARD MASK LAYER DISPOSED ABOVE THE THIRD HARD MASK LAYER, AND A FIRST HARD MASK LAYER DISPOSED ABOVE THE SECOND HARD MASK LAYER.

508

ALTERNATIVELY ETCHING THE SUBSTRATE WITH A FIRST ETCCHANT AND A SECOND ETCCHANT, WHEREIN THE FIRST ETCCHANT HAS A LOW SELECTIVITY TO A FIRST HARD MASK MATERIAL OF THE FIRST HARD MASK LAYER, A THIRD HARD MASK MATERIAL OF THE A THIRD HARD MASK LAYER, AND A FIRST BARRIER LAYER MATERIAL OF THE FIRST BARRIER LAYER, BUT A HIGH SELECTIVITY TO A SECOND HARD MASK MATERIAL OF THE SECOND HARD MASK LAYER, AND WHEREIN THE SECOND ETCCHANT HAS A HIGH SELECTIVITY TO THE FIRST HARD MASK MATERIAL OF THE FIRST HARD MASK LAYER, THE THIRD HARD MASK MATERIAL OF THE THIRD HARD MASK LAYER, AND THE FIRST BARRIER LAYER MATERIAL OF THE FIRST BARRIER LAYER, AND THE FIRST ETCCHANT HAS A LOW SELECTIVITY TO THE SECOND HARD MASK MATERIAL OF THE SECOND HARD MASK LAYER AND THE SECOND BARRIER LAYER.

FIG. 5B